Structure of DIP and Fourier Transformation

DingHao

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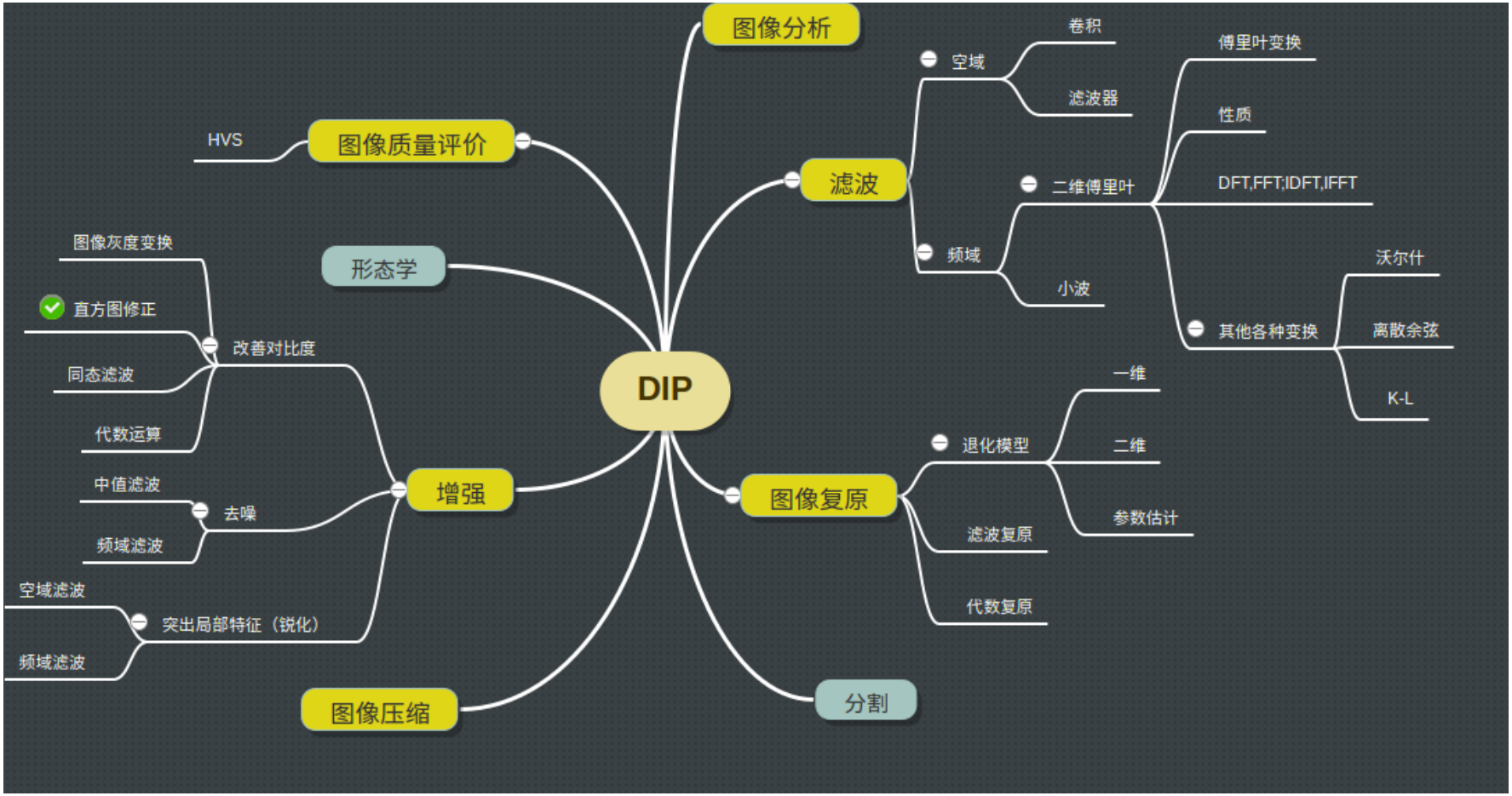
Contents

DIP

Structure



DIP

Image quality evaluation

- Subjective
- Objective
- HVS
  Sensitiveness
  Brightness
  CSF
  Mach effect
  Masking effect

DIP

Mathhematical manipulation

- Fourier
- Gabor

  Compress

  Reinforce

  Merge

  Detection

DIP

Reinforce

- Improve contrast
  Grey-scale transformation
  Histogram modification
- Denoising
  Masking
  Median filter
  Gabor
  BM3D
- Sharpen
  Differential
  Masking

DIP

Recovery

Degradation mechanism
Filter restoration
Algobraic restoration

Fourier Transformation

Formula

FT , DFT , 2-D FT , 2-D DFT

Character

Shift , periodicity , ...

Calculation

DFT & IDFT

Fourier Transformation

Formular

$$F(u,v) = \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} f(x,y) e^{-j2\pi(\frac{ux}{M} + \frac{vy}{N})}$$

$$u = 0, 1, 2, ..., M-1$$

$$v = 0, 1, 2, ..., N-1$$

Fourier Transformation

2-D DFT

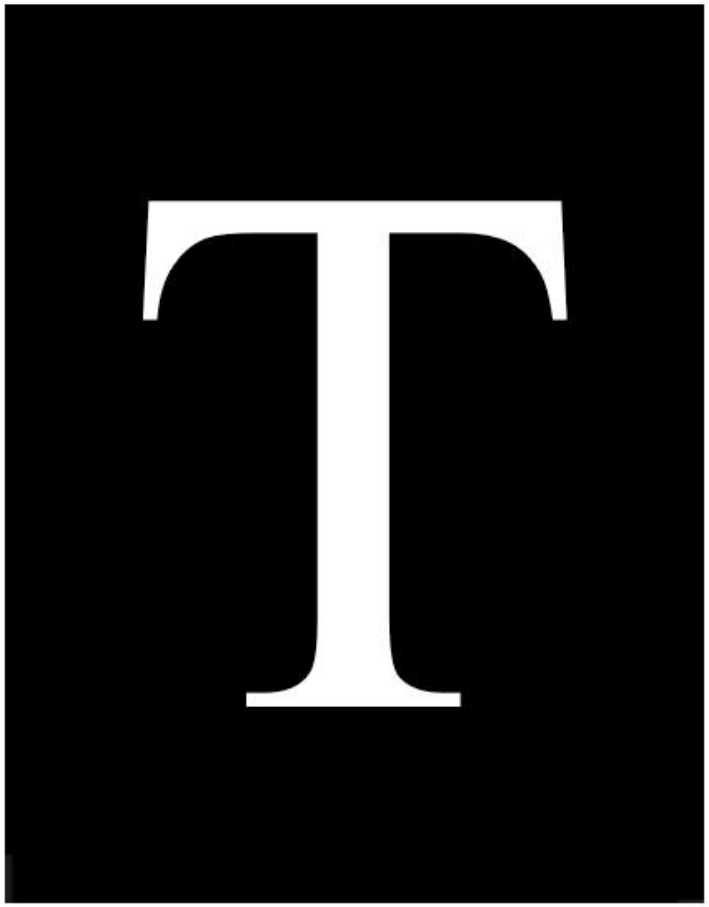


Figure: src

Fourier Transformation

2-D DFT

Move to centre:

$$f(x,y)(-1)^{x+y} \Longleftrightarrow F(u-\frac{M}{2},\frac{N}{2})$$

Fourier Transformation

2-D DFT

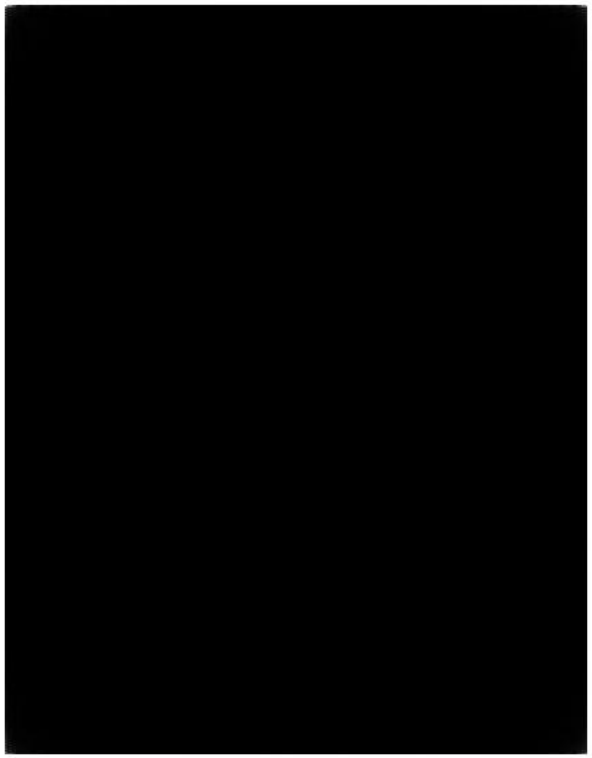


Figure: fourier

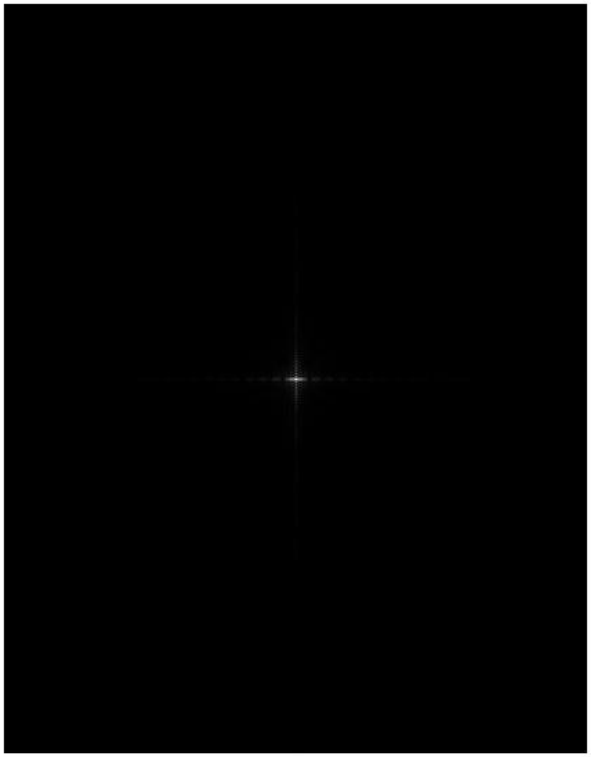


Figure: centre

Fourier Transformation

2-D DFT

Amplitude:

$$| F(u,v) | = [R(u,v)^2 + I(u,v)^2]^{\frac{1}{2}}$$

Phase:

$$\varphi(u,v) = tan^{-1}[\frac{I(u,v)}{R(u,v)}]$$

Fourier Transformation

2-D DFT

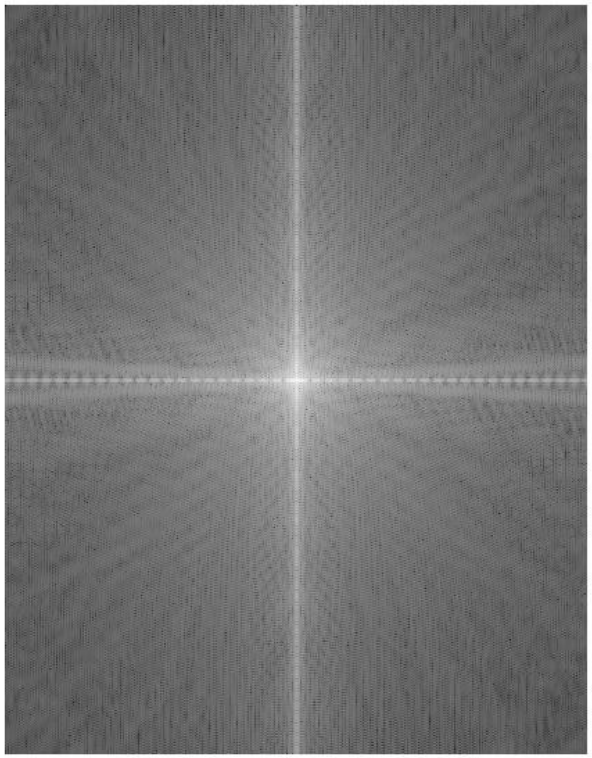


Figure: amplitude

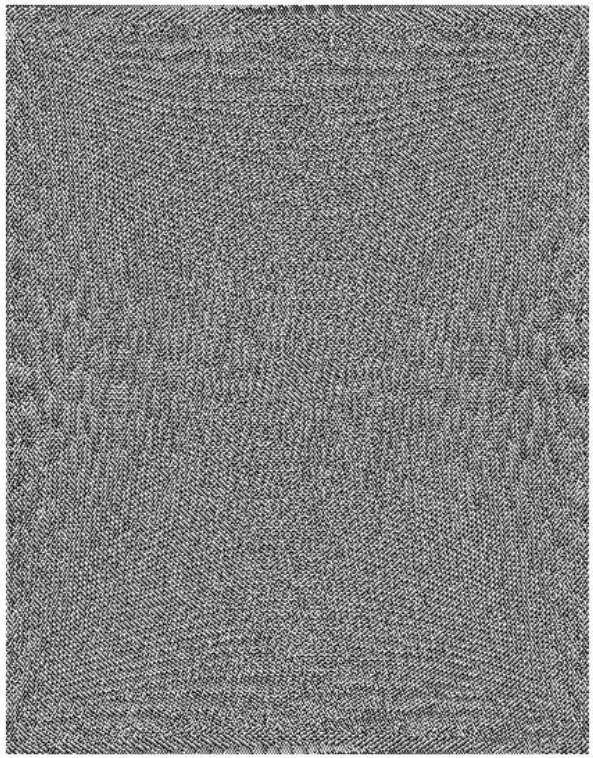


Figure: phase

Fourier Transformation

2-D DFT

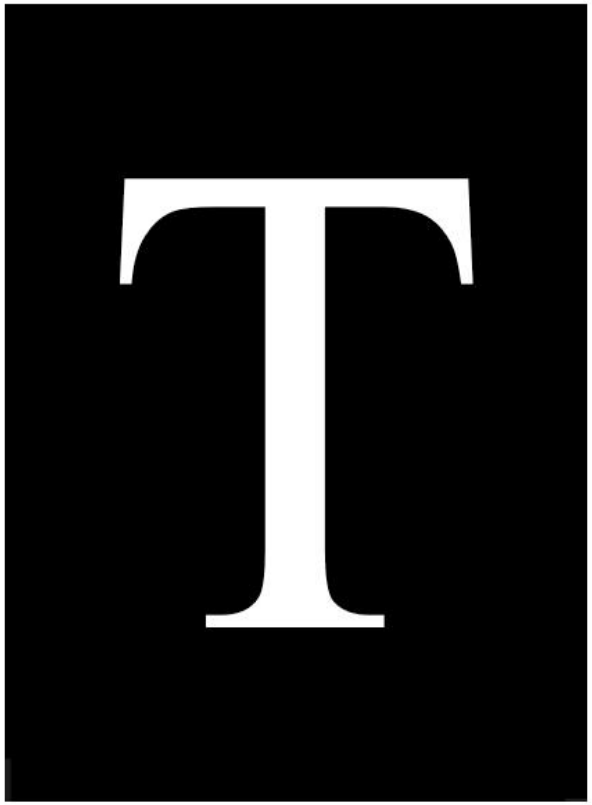


Figure: inverse fourier

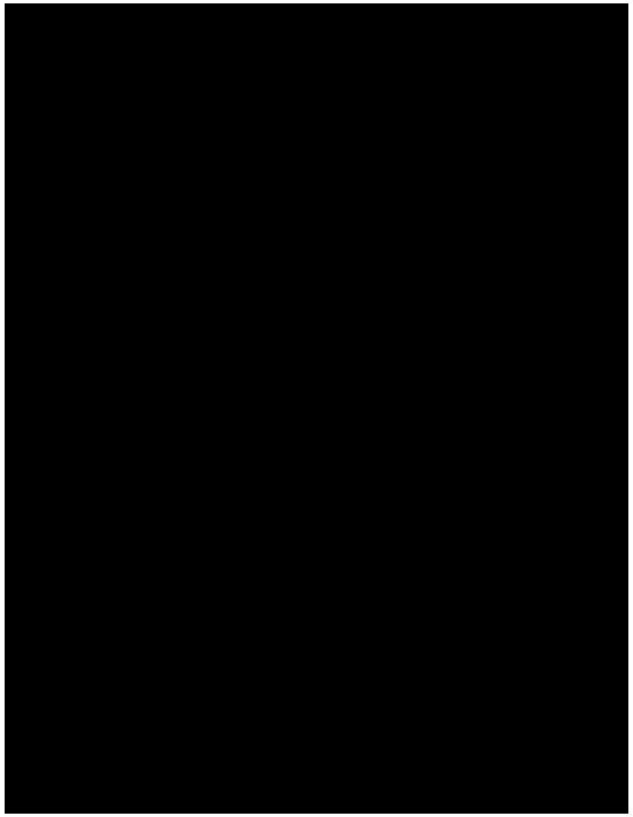


Figure: subtraction

Fourier Transformation

2-D DFT

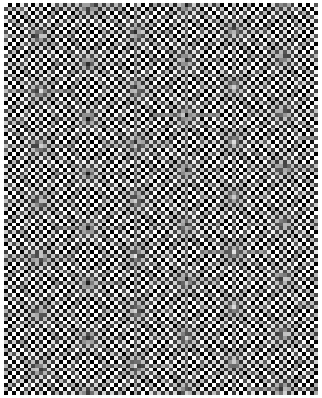


Figure: src

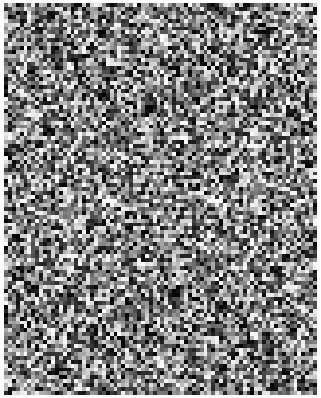


Figure: real

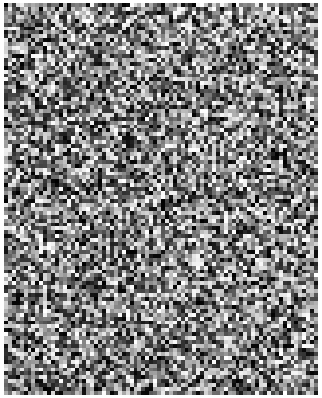


Figure: imagin

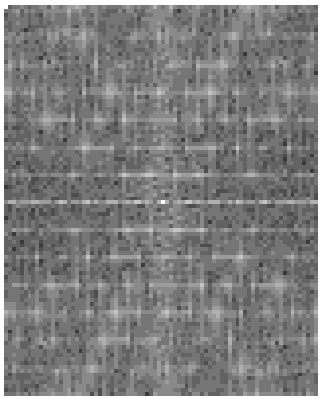


Figure: amplitude

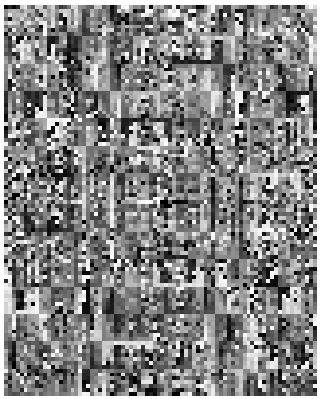


Figure: phase

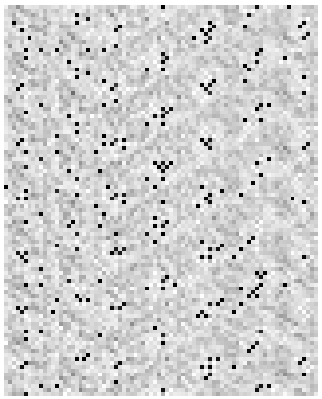
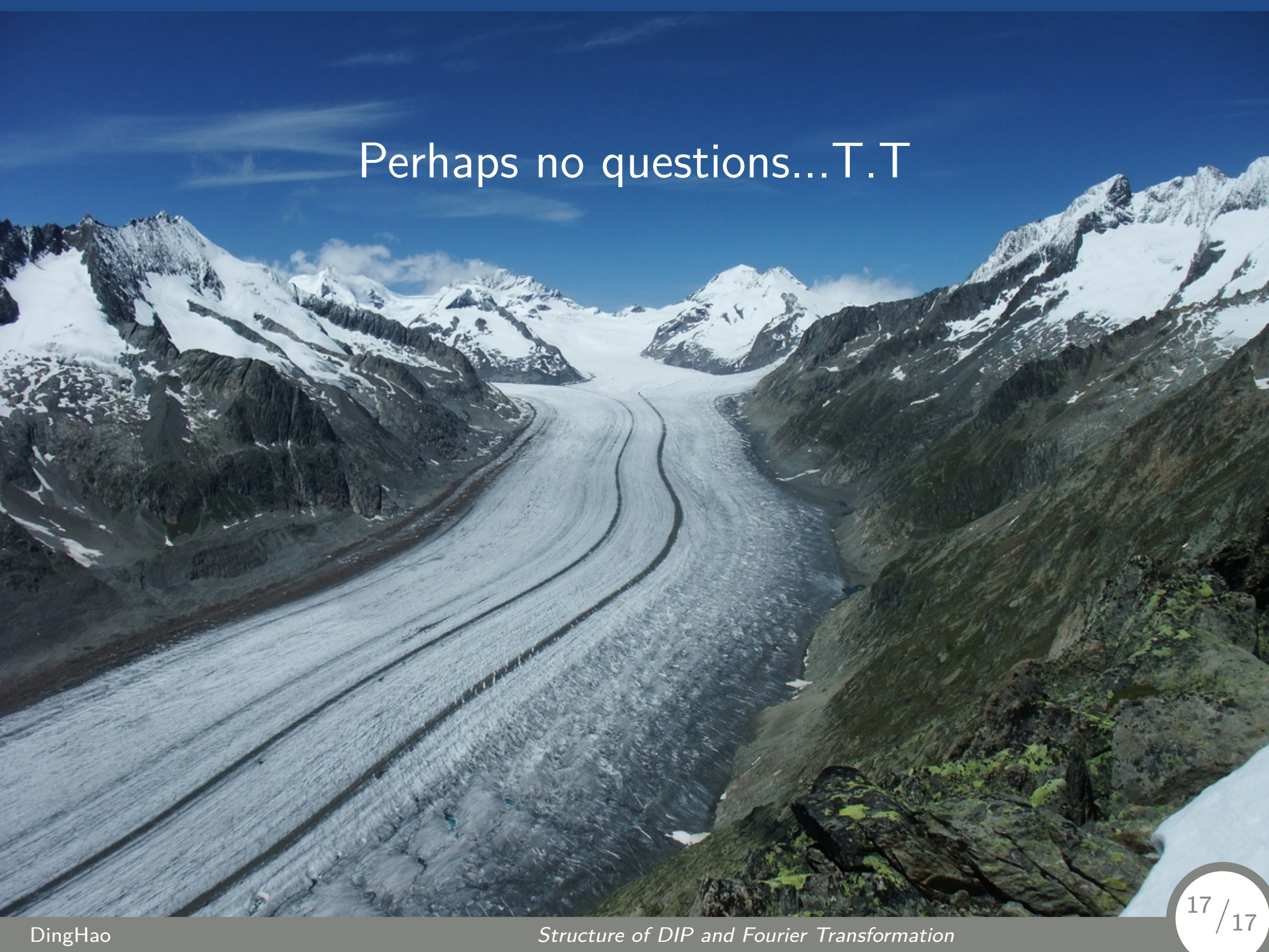


Figure: idft


Perhaps no questions...T.T